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**TREASURY DEPARTMENT**

**UNITED STATES PUBLIC HEALTH SERVICE**

**MISCELLANEOUS PUBLICATION No. 1**

**INTERSTATE  
QUARANTINE REGULATIONS  
OF THE  
UNITED STATES**

**1916**

Prepared by direction of the Surgeon General



**WASHINGTON  
GOVERNMENT PRINTING OFFICE**

1916

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**in the City of New York**

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# QUARANTINE LAWS OF THE UNITED STATES.

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An act to prevent the introduction of contagious diseases from one State to another and for the punishment of certain offenses.

(U. S. Stats. at Large, vol. 26, ch. 51, p. 31. Approved Mar. 27, 1890.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That whenever it shall be made to appear to the satisfaction of the President that cholera, yellow fever, smallpox, or plague exists in any State or Territory, or in the District of Columbia, and that there is danger of the spread of such disease into other States, Territories, or the District of Columbia, he is hereby authorized to cause the Secretary of the Treasury to promulgate such rules and regulations as in his judgment may be necessary to prevent the spread of such disease from one State or Territory into another, or from any State or Territory into the District of Columbia, or from the District of Columbia into any State or Territory, and to employ such inspectors and other persons as may be necessary to execute such regulations to prevent the spread of such disease. The said rules and regulations shall be prepared by the Supervising Surgeon General of the Marine-Hospital Service under the direction of the Secretary of the Treasury. And any person who shall willfully violate any rule or regulation so made and promulgated shall be deemed guilty of a misdemeanor, and upon conviction shall be punished by a fine of not more than five hundred dollars, or imprisonment for not more than two years, or both, in the discretion of the court.

SEC. 2. That any officer, or person acting as an officer, or agent of the United States at any quarantine station, or other person employed to aid in preventing the spread of such disease, who shall willfully violate any of the quarantine laws of the United States or any of the rules and regulations made and promulgated by the Secretary of the Treasury as provided for in section one of this act, or any lawful order of his superior officer or officers, shall be deemed guilty of a misdemeanor, and upon conviction shall be punished by a fine of not more than three hundred dollars or imprisonment for not more than one year, or both, in the discretion of the court.

SEC. 3. That when any common carrier or officer, agent, or employee of any common carrier shall willfully violate any of the quarantine laws of the United States, or the rules and regulations made and promulgated as provided for in section one of this act, such common carrier, officer, agent, or employee shall be deemed guilty of a misdemeanor, and shall, on conviction, be punished by a fine of not more than five hundred dollars, or imprisonment for not more than two years, or both, in the discretion of the court.

An act granting additional quarantine powers and imposing additional duties upon the Marine-Hospital Service.

(U. S. Stats. at Large, vol. 27, ch. 114, p. 449. Approved Feb. 15, 1893.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That it shall be unlawful for any merchant ship or other vessel from any foreign port or place to enter any port of the United States except in accordance with the provisions of this act and with such rules and regulations of State and municipal health authorities as may be made in pursuance of or consistent with this

act; and any such vessel which shall enter, or attempt to enter, a port of the United States in violation thereof shall forfeit to the United States a sum, to be awarded in the discretion of the court, not exceeding five thousand dollars, which shall be a lien upon said vessel, to be recovered by proceedings in the proper district court of the United States. In all such proceedings the United States district attorney for such district shall appear on behalf of the United States; and all such proceedings shall be conducted in accordance with the rules and laws governing cases of seizure of vessels for violation of the revenue laws of the United States.

SEC. 2. That any vessel at any foreign port clearing for any port or place in the United States shall be required to obtain from the consul, vice consul, or other consular officer of the United States at the port of departure, or from the medical officer where such officer has been detailed by the President for that purpose, a bill of health, in duplicate, in the form prescribed by the Secretary of the Treasury, setting forth the sanitary history and condition of said vessel, and that it has in all respects complied with the rules and regulations in such cases prescribed for securing the best sanitary condition of the said vessel, its cargo, passengers, and crew; and said consular or medical officer is required, before granting such duplicate bill of health, to be satisfied that the matters and things therein stated are true; and for his services in that behalf he shall be entitled to demand and receive such fees as shall by lawful regulation be allowed, to be accounted for as is required in other cases.

The President, in his discretion, is authorized to detail any medical officer of the Government to serve in the office of the consul at any foreign port for the purpose of furnishing information and making the inspection and giving the bills of health hereinbefore mentioned. Any vessel clearing and sailing from any such port without such bill of health, and entering any port of the United States, shall forfeit to the United States not more than five thousand dollars, the amount to be determined by the court, which shall be a lien on the same, to be recovered by proceedings in the proper district court of the United States. In all such proceedings the United States district attorney for such district shall appear on behalf of the United States; and all such proceedings shall be conducted in accordance with the rules and laws governing cases of seizure of vessels for violation of the revenue laws of the United States.

SEC. 3. That the Supervising Surgeon General of the Marine-Hospital Service shall, immediately after this act takes effect, examine the quarantine regulations of all State and municipal boards of health, and shall, under the direction of the Secretary of the Treasury, cooperate with and aid State and municipal boards of health in the execution and enforcement of the rules and regulations of such boards and in the execution and enforcement of the rules and regulations made by the Secretary of the Treasury to prevent the introduction of contagious or infectious diseases into the United States from foreign countries, and into one State or Territory or the District of Columbia from another State or Territory or the District of Columbia; and all rules and regulations made by the Secretary of the Treasury shall operate uniformly and in no manner discriminate against any port or place; and at such ports and places within the United States as have no quarantine regulations under State or municipal authority, where such regulations are, in the opinion of the Secretary of the Treasury, necessary to prevent the introduction of contagious or infectious diseases into the United States from foreign countries, or into one State or Territory or the District of Columbia from another State or Territory or the District of Columbia, and at such ports and places within the United States where quarantine regulations exist under the authority of the State or municipality which, in the opinion of the Secretary of the Treasury, are not sufficient to prevent the introduction of such diseases into the United States, or into one State or Territory or the District of Columbia from another State or Territory or the District of Columbia, the Secretary of the Treasury shall, if in his judgment it is necessary and proper, make such additional rules and regulations as are necessary to prevent the introduction of such diseases

into the United States from foreign countries, or into one State or Territory or the District of Columbia from another State or Territory or the District of Columbia, and when such rules and regulations have been made they shall be promulgated by the Secretary of the Treasury, and enforced by the sanitary authorities of the States and municipalities, where the State and municipal health authorities will undertake to execute and enforce them; but if the State or municipal authorities shall fail or refuse to enforce said rules and regulations the President shall execute and enforce the same and adopt such measures as in his judgment shall be necessary to prevent the introduction or spread of such diseases, and may detail or appoint officers for that purpose. The Secretary of the Treasury shall make such rules and regulations as are necessary to be observed by vessels at the port of departure and on the voyage, where such vessels sail from any foreign port or place to any port or place in the United States, to secure the best sanitary condition of such vessel, her cargo, passengers, and crew, which shall be published and communicated to and enforced by the consular officers of the United States. None of the penalties herein imposed shall attach to any vessel or owner or officer thereof until a copy of this act, with the rules and regulations made in pursuance thereof, has been posted up in the office of the consul or other consular officer of the United States for ten days in the port from which said vessel sailed; and the certificate of such consul or consular officer over his official signature shall be competent evidence of such posting in any court of the United States.

SEC. 4. That it shall be the duty of the Supervising Surgeon General of the Marine Hospital Service, under the direction of the Secretary of the Treasury, to perform all the duties in respect to quarantine and quarantine regulations which are provided for by this act, and to obtain information of the sanitary condition of foreign ports and places from which contagious and infectious diseases are or may be imported into the United States; and to this end the consular officers of the United States at such ports and places as shall be designated by the Secretary of the Treasury shall make to the Secretary of Treasury weekly reports of the sanitary condition of the ports and places at which they are respectively stationed, according to such forms as the Secretary of the Treasury shall prescribe; and the Secretary of the Treasury shall also obtain, through all sources accessible, including State and municipal sanitary authorities throughout the United States, weekly reports of the sanitary condition of ports and places within the United States, and shall prepare, publish, and transmit to collectors of customs and to State and municipal health officers and other sanitarians weekly abstracts of the consular sanitary reports and other pertinent information received by him, and shall also, as far as he may be able, by means of the voluntary cooperation of State and municipal authorities, of public associations and private persons, procure information relating to the climatic and other conditions affecting the public health, and shall make an annual report of his operations to Congress, with such recommendations as he may deem important to the public interest.

SEC. 5. That the Secretary of the Treasury shall from time to time issue to the consular officers of the United States and to the medical officers serving at any foreign port, and otherwise make publicly known, the rules and regulations made by him, to be used and complied with by vessels in foreign ports, for securing the best sanitary conditions of such vessels, their cargoes, passengers, and crew, before their departure for any port in the United States and in the course of the voyage, and all such other rules and regulations as shall be observed in the inspection of the same on the arrival thereof at any quarantine station at the port of destination, and for the disinfection and isolation of the same, and the treatment of cargo and persons on board, so as to prevent the introduction of cholera, yellow fever, or other contagious or infectious diseases; and it shall not be lawful for any vessel to enter said port to discharge its cargo or land its passengers except upon a certificate of the health officer at such quarantine station certifying that said rules and regulations have in all respects been

observed and complied with, as well on his part as on the part of the said vessel and its master, in respect to the same and to its cargo, passengers, and crew; and the master of every such vessel shall produce and deliver to the collector of customs at said port of entry, together with the other papers of the vessel, the said bills of health required to be obtained at the port of departure and the certificate herein required to be obtained from the health officer at the port of entry, and that the bills of health herein prescribed shall be considered as part of the ship's papers, and when duly certified to by the proper consular or other officer of the United States, over his official signature and seal, shall be accepted as evidence of the statements therein contained in any court of the United States.

SEC. 6. That on the arrival of an infected vessel at any port not provided with proper facilities for treatment of the same the Secretary of the Treasury may remand said vessel, at its own expense, to the nearest national or other quarantine station, where accommodations and appliances are provided for the necessary disinfection and treatment of the vessel, passengers, and cargo; and after treatment of any infected vessel at a national quarantine station, and after certificate shall have been given by the United States quarantine officer at said station that the vessel, cargo, and passengers are each and all free from infectious disease, or danger of conveying the same, said vessel shall be admitted to entry to any port of the United States named within the certificate. But at any ports where sufficient quarantine provision has been made by State or local authorities the Secretary of the Treasury may direct vessels bound for said ports to undergo quarantine at said State or local station.

SEC. 7. That whenever it shall be shown to the satisfaction of the President that by reason of the existence of cholera or other infectious or contagious diseases in a foreign country there is serious danger of the introduction of the same into the United States, and that notwithstanding the quarantine defense this danger is so increased by the introduction of persons or property from such country that a suspension of the right to introduce the same is demanded in the interest of the public health, the President shall have power to prohibit, in whole or in part, the introduction of persons and property from such countries or places as he shall designate and for such period of time as he may deem necessary.

SEC. 8. That whenever the proper authorities of a State shall surrender to the United States the use of the buildings and disinfecting apparatus at a State quarantine station the Secretary of the Treasury shall be authorized to receive them and to pay a reasonable compensation to the State for their use, if, in his opinion, they are necessary to the United States.

SEC. 9. That the act entitled "An act to prevent the introduction of infectious or contagious diseases into the United States, and to establish a national board of health," approved March 3, 1879, be, and the same is hereby, repealed. And the Secretary of the Treasury is directed to obtain possession of any property, furniture, books, paper, or records belonging to the United States, which are not in the possession of an officer of the United States under the Treasury Department, which were formerly in the use of the National Board of Health or any officer or employee thereof.

An act to amend section two of the act approved February 15, 1893, entitled "An act granting additional quarantine powers and imposing additional duties upon the Marine-Hospital Service."

(U. S. Stats. at Large, vol. 28, ch. 300, p. 372. Approved Aug.-18, 1894.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That section two of the act approved February fifteenth, eighteen hundred and ninety-three, entitled "An act granting additional quarantine powers and imposing additional duties upon the Marine-Hospital Service," is hereby amended by adding to the end of said section the following:



The provisions of this section shall not apply to vessels plying between foreign ports on or near the frontiers of the United States and ports adjacent thereto; but the Secretary of the Treasury is hereby authorized, when, in his discretion, it is expedient for the preservation of the public health, to establish regulations governing such vessels.

An act to amend "An act granting additional quarantine powers and imposing additional duties upon the Marine-Hospital Service," approved February 15, 1893.

(U. S. Stats. at Large, vol. 31, ch. 836, p. 1086. Approved Mar. 3, 1901.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That* "an act granting additional quarantine powers and imposing additional duties upon the Marine-Hospital Service," approved February 15, 1893, be amended by addition of the following sections:

SEC. 10. That the supervising Surgeon General, with the approval of the Secretary of the Treasury, is authorized to designate and mark the boundaries of the quarantine grounds and quarantine anchorages for vessels which are reserved for use at each United States quarantine station; and any vessel or officer of any vessel or other person other than State or municipal health or quarantine officers, trespassing or otherwise entering upon such grounds or anchorages in disregard of the quarantine rules and regulations, or without permission of the officer in charge of such station, shall be deemed guilty of a misdemeanor and subject to arrest, and upon conviction thereof be punished by a fine of not more than three hundred dollars or imprisonment for not more than one year, or both, in the discretion of the court. Any master or owner of any vessel, or any person violating any provision of this act or any rule or regulation made in accordance with this act, relating to inspection of vessels or relating to the prevention of the introduction of contagious or infectious diseases, or any master, owner, or agent of any vessel making a false statement relative to the sanitary condition of said vessel or its contents or as to the health of any passenger or person thereon, shall be deemed guilty of a misdemeanor and subject to arrest, and upon conviction thereof be punished by a fine of not more than five hundred dollars or imprisonment for not more than one year, or both, in the discretion of the court.

SEC. 11. That any vessel sailing from any foreign port without the bill of health required by section two of this act, and arriving within the limits of any collection district of the United States, and not entering or attempting to enter any port of the United States, shall be subject to such quarantine measures as shall be prescribed by regulations of the Secretary of the Treasury, and the cost of such measures shall be a lien on said vessel, to be recovered by proceedings in the proper district court of the United States and in the manner set forth above as regards vessels from foreign ports without bills of health and entering any port of the United States.

SEC. 12. That the medical officers of the United States, duly clothed with authority to act as quarantine officers at any port or place within the United States, and when performing the said duties, are hereby authorized to take declarations and administer oaths in matters pertaining to the administration of the quarantine laws and regulations of the United States.



## INTERSTATE QUARANTINE REGULATIONS.

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TREASURY DEPARTMENT,  
OFFICE OF THE SECRETARY,  
*Washington, January 15, 1916.*

*To medical officers of the United States Public Health Service, State and local health authorities, and others concerned:*

Upon the recommendation of the Surgeon General of the United States Public Health Service and pursuant to the act of Congress approved February 15, 1893, entitled "An act granting additional quarantine powers and imposing additional duties upon the Marine-Hospital Service," the following interstate quarantine regulations for the prevention of the introduction of contagious and infectious diseases into one State or Territory or the District of Columbia from another State or Territory or the District of Columbia are hereby promulgated for the information and guidance of all concerned.

All regulations inconsistent herewith are hereby revoked.

W. G. McADOO, *Secretary.*



## INTERSTATE QUARANTINE REGULATIONS.

SECTION. 1. For the purposes of interstate quarantine the following diseases shall be regarded as contagious and infectious diseases within the meaning of section 3 of the act approved February 15, 1893: Plague, cholera, typhoid fever, pulmonary tuberculosis, yellow fever, smallpox, leprosy, typhus fever, scarlet fever, diphtheria, measles, whooping cough, poliomyelitis (infantile paralysis), Rocky Mountain spotted or tick fever, and epidemic cerebro-spinal meningitis; and any person affected with any disease aforesaid, and anything, living or dead, which has been affected with or exposed to the contagion or infection of any such disease, except as otherwise provided in these regulations, shall be regarded as contagious or infectious until the contrary has been proven.

SEC. 2. Common carriers by land or water, while engaging in commerce between any of the several States or Territories or the District of Columbia, shall maintain at all times in a clean and sanitary condition all cars, vessels, vehicles, or conveyances so being operated by them.

SEC. 3. The living quarters for the personnel of vessels shall be fumigated at least once every six months for the extermination of insects and vermin, and also upon the removal of a case or cases of any disease mentioned in section 1.

SEC. 4. Common carriers shall not permit, nor cause, to be cleaned any car, vessel, vehicle, or other conveyance operating in interstate traffic while the same is occupied by passengers, unless said cleaning is done in such manner as to prevent the distribution of dust.

SEC. 5. Any person, firm, or corporation supplying sleeping accommodations for passengers traveling in interstate traffic shall furnish the bed, couch, or other appliance used for sleeping purposes with clean sheets and pillowcases which have not been used by any other person since last laundered: *Provided*, That blankets, pillows, and mattresses which have not been used by any person suffering from a disease mentioned in section 1, if

Contagious or infectious diseases. Act approved Feb. 15, 1893, U. S. Stats. at Large, vol. 27, ch. 444, p. 114.

Interstate vehicles to be clean.

Fumigation of forecastles. Act approved Mar. 9, 1915.

Cleaning of cars.

Bedding.

physically clean and free from vermin, may be used if they are so enveloped as not to come in contact in any way with any occupant of such bed, couch, or other appliance for sleeping purposes.

Ventilation.

SEC. 6. All cars, vessels, vehicles or conveyances operating for the use of passengers traveling in interstate traffic shall be so ventilated as to insure an adequate supply of fresh air.

Toilets and lavatories.

SEC. 7. Toilets and lavatories on cars, vessels, vehicles, or conveyances operating for the use of passengers traveling in interstate traffic shall be of adequate size, design, and number, and shall be maintained in a clean and sanitary condition.

Prevention of spitting.

SEC. 8. Common carriers by land or water while engaging in commerce between any of the several States or Territories or the District of Columbia shall take adequate measures by the use of warning signs or cuspidors, or both, for the prevention of the soiling of cars, vessels, vehicles, or conveyances with sputum, and said cuspidors shall be adequate in size and number and suitable in design for the reception of sputum, and shall be maintained in a clean and sanitary condition.

Common towels.  
Dec. 9, 1912.

SEC. 9. Common carriers shall not provide in cars, vessels, vehicles, or conveyances operated in interstate traffic, or in depots, waiting rooms, or other places used by passengers traveling from one State or Territory or the District of Columbia to another State or Territory or the District of Columbia, any towel for use by more than one person: *Provided*, That towels may be used again after having been cleansed and sterilized with boiling water.

Common drinking cup.  
Oct. 30, 1912.

SEC. 10. Common carriers shall not provide in cars, vessels, vehicles, or conveyances operated in interstate traffic, or in depots, waiting rooms, or other places used by passengers traveling from one State or Territory or the District of Columbia to another State or Territory or the District of Columbia, any drinking cup, glass, or vessel for common use: *Provided*, That this regulation shall not be held to preclude the use of drinking cups, glasses, or vessels which are thoroughly cleansed or sterilized after use by each individual, nor shall it be held to preclude the use of sanitary devices for individual use only.

Food and drink for interstate passengers.

SEC. 11. Persons, firms, or corporations engaging in the business of furnishing food or drink for the use of passengers traveling in interstate traffic shall not supply any article of food or drink, unless the same shall have

been obtained from a source known to be free from contagion or infection of the disease mentioned in section 1, or unless the same shall have been disinfected, or otherwise treated in such manner that the article is free from the contagion or infection as aforesaid, or drink for said passengers, or as to prevent contamination or infection.

SEC. 12. After notice has been given by health authorities, no person shall be accepted for transport from premises where scarlet fever, typhoid fever, or other infectious disease is prevalent, unless that person has been supplied with a certificate of health from a physician.

on carriers while engaging in interstate  
 sh to their crews or employees any  
 king purposes which may contain  
 s likely to cause a contagious or  
 shall such carriers maintain or  
 on their vessels or vehicles, or  
 or other ordinary stopping  
 ve control any tank, cis-  
 icle with water which  
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 purposes, unless  
 on said vessels  
 k, cistern,  
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under date of October 21, 1914:<sup>1</sup> *Provided*, That water in regard to the safety of which a reasonable doubt exists may be used if the same has been treated in such manner as to render it incapable of conveying disease, and the fact of such treatment is certified by the aforesaid health authority or by the Surgeon General of the United States Public Health Service or his accredited representative.

SEC. 17. Common carriers shall not knowingly accept for transportation from one State or Territory or the District of Columbia into another State or Territory or the District of Columbia any person suffering from any of the diseases mentioned in section 1, except as hereinafter provided.

SEC. 18. No person knowing that he is in the communicable stage of any of the diseases enumerated in section 1 shall travel on any car, vessel, vehicle, or conveyance engaging in interstate traffic, except as hereinafter provided, nor shall any parent or guardian allow any minor, or other person under his charge who is in the communicable stage of any of such diseases, to travel in any car, vessel, vehicle, or conveyance engaging in interstate traffic.

SEC. 19. No person, firm, or corporation shall offer for shipment in interstate traffic, and no common carrier shall accept for shipment, or transport in interstate traffic, any article or thing known to have been exposed to the contagion or infection of any of the diseases enumerated in section 1, unless a certificate has previously been obtained from the proper health authority<sup>2</sup> that all necessary measures have been taken to render said article or thing free from infection; and in the case of yellow fever, Rocky Mountain spotted or tick fever, or typhus fever, free from mosquitoes, ticks, or lice.

SEC. 20. In the event of the appearance of human or rodent plague in any port or place within the United States, the Surgeon General of the United States Public Health Service shall establish such outgoing quarantine measures as will in his opinion prevent the introduction of the disease into another State or Territory or the District of Columbia: *Provided*, That freight which is known to have originated in rat-free surroundings and is shipped from rat-proof, rat-free warehouses, docks, or wharves,

<sup>1</sup> See Appendix.

<sup>2</sup> The term "proper health authority" shall be construed to mean the health officer within whose jurisdiction the article or thing originates, or during the presence of epidemic, the officer in charge of the measures to prevent the spread of same.

in rat-proof, rat-free cars, vessels, vehicles, or conveyances, may be granted pratique for interstate transportation when so certified by the Surgeon General of the United States Public Health Service or his accredited representative.

Prevention  
spread of disease  
from infected per-  
sons.

SEC. 21. Any person or thing either living or dead, which has been exposed to or is infected with any of the diseases enumerated in section 1, if found in any car, vessel, vehicle, or conveyance undergoing interstate transportation, shall be subjected to such inspection, disinfection, or other measures as may be necessary to prevent the spread of the infection from them.

Sick passenger.

SEC. 22. In the event of the appearance of any disease mentioned in section 1, with the exception of tuberculosis, in any person en route or aboard any car, vessel, vehicle, or conveyance operating in interstate traffic, the common carrier shall at once isolate the sick person and remove him from the car, vessel, vehicle, or conveyance at the first convenient place at which reasonable provision may be had for the protection of the patient and the public health, and shall immediately notify the Surgeon General of the United States Public Health Service and the State and local health officer of the place at which the person was removed from such car, vessel, vehicle, or conveyance, and shall disinfect the compartment from which the person was removed.<sup>1</sup>

Infected per-  
sons who may not  
travel.

SEC. 23. No person affected with plague, cholera, smallpox, scarlet fever, or yellow fever shall be received upon any vessel, car, vehicle, or conveyance operating in interstate traffic.

Interstate car-  
riage of typhoid  
patients.

SEC. 24. Common carriers shall not receive upon any car, vessel, vehicle, or conveyance operating in interstate traffic any person affected with typhoid fever, unless removal and entrance permits have been granted by the State or local health officers at places of departure and arrival, and unless said person is placed in a separate compartment and is accompanied by a properly qualified nurse or attendant, and unless said nurse or attendant shall obligate himself or herself in writing, to the common carrier, to comply with the following regulations while in transit:

Rules for nurses  
accompanying  
typhoid patients.

(a) 1. Communication with the compartment in which the patient is traveling shall be restricted to the minimum consistent with the proper care and safety of the patient.

<sup>1</sup> See Appendix.

2. All dishes or utensils used by the patient en route shall be placed in a 5 per cent solution of carbolic acid or in disinfecting fluid of equivalent disinfecting value for at least one hour before being allowed to leave the compartment.

3. All urine, bowel movements, or other discharges from the patient shall be received into a 5 per cent solution of carbolic acid or disinfecting fluid of equivalent disinfecting value, placed in a covered vessel and allowed to stand undisturbed for at least two hours after the last addition thereto; upon the expiration of the time stated they may be burned, destroyed, or emptied into a common sewer at any convenient port or place.

4. Said nurse or attendant shall use all necessary precautions to prevent access of flies to the patient, and after performing service of any nature to the patient shall at once cleanse the hands by thorough washing in a 2 per cent solution of carbolic acid or other solution of equivalent disinfecting value.

(b) Immediately upon the disembarkation of the patient the common carrier shall close the compartment the patient has vacated, without removal of any of its contents, and shall keep the same closed until disinfected.<sup>1</sup>

Disinfection of compartment.

SEC. 25. In the event of the occurrence of a case of yellow fever en route or upon any car, vessel, vehicle, or conveyance operating for the transportation of passengers in interstate traffic, the case shall be isolated in a compartment or place so screened as to prevent the entrance or exit of mosquitoes, or their access to the patient; and the patient shall not be disembarked in infectible territory unless thoroughly protected from mosquitoes, and unless permission for such disembarkation has been obtained from the State and local health officials having jurisdiction over the place of disembarkation, and immediately upon such disembarkation the compartment vacated by the patient shall be fumigated in such manner as to insure the complete destruction of all mosquitoes contained therein.

Yellow fever en route.

SEC. 26. Common carriers shall neither cause, permit, or allow to be hauled, removed, or transferred in interstate traffic any car, vessel, vehicle, or conveyance from a locality in which yellow fever prevails, unless there has been obtained from the Surgeon General of the United States Public Health Service, or his accredited repre-

Transportation vessels and vehicles from yellow fever localities.

<sup>1</sup> See Appendix.

sentative, a certificate stating that said car, vessel, vehicle, or conveyance has been fumigated to destroy mosquitoes, or has been so safeguarded as to prevent the entrance of mosquitoes.

Transportation  
of diphtheria,  
measles, and  
whooping-cough  
patients.

SEC. 27. Common carriers shall not receive upon any car, vessel, vehicle, or conveyance operating in interstate traffic any person affected with diphtheria, measles, or whooping cough, or any person known to be a carrier of the bacillus diphtheriae, unless removal and entrance permits have been granted by the State or local health officers at the places of departure and arrival, and unless said person is placed in a separate compartment and is accompanied by a properly qualified nurse or attendant and unless such nurse or attendant has pledged himself or herself in writing, to the common carrier, to comply with the following regulations while in transit:

(a) 1. Communication with the compartment within which the patient is traveling shall be restricted to the minimum consistent with the proper care and safety of the patient.

2. All dishes or utensils used by the patient en route shall be placed in a 5 per cent solution of carbolic acid or disinfecting fluid of equivalent disinfecting value for at least one hour before being allowed to leave the compartment.

3. All sputum and nasal discharges from the patient shall be received in gauze or paper, which shall be deposited into a closed container and which shall be destroyed by burning or received in a 5 per cent solution of carbolic acid or disinfecting fluid of equivalent disinfecting value placed in a covered vessel and allowed to stand undisturbed for at least two hours after the last addition thereto.

(b) Immediately upon the disembarkation of the patient the common carrier shall close the compartment the patient has vacated, without the removal of any of its contents, and shall keep the same closed until disinfection.<sup>1</sup>

Transportation  
of tuberculous  
persons.

SEC. 28. Common carriers shall not receive for interstate transportation any person known by them to be suffering from pulmonary tuberculosis in a communicable stage unless said person is provided with the following articles:

<sup>1</sup> See Appendix.

(a) 1. A sputum cup made of impervious material and so arranged or constructed to admit of being tightly closed when not in use.<sup>1</sup>

2. A sufficient supply of handkerchiefs, gauze, or similar articles of sufficient size to cover the nose and mouth while coughing and sneezing. Said handkerchiefs, gauze, or similar articles shall be inclosed in a tight container after use and shall be destroyed by burning.

3. All sputum and nasal discharges from the patient shall be received in gauze or paper, which shall be deposited in a closed container and which shall be destroyed by burning or received in a 5 per cent solution of carbolic acid or disinfecting fluid of equivalent disinfecting value placed in a covered vessel and allowed to stand undisturbed for at least two hours after the last addition thereto.

(b) Immediately upon the disembarkation of the patient the common carrier shall close the compartment the patient has vacated, without the removal of any of its contents, and shall keep the same closed until disinfection.<sup>2</sup>

(c) Passengers in interstate traffic having pulmonary tuberculosis in a communicable stage shall not expectorate except in the sputum cup or gauze aforementioned.

SEC. 29. Common carriers shall not accept for transportation nor transport in interstate traffic any person suffering from or afflicted with leprosy unless there has been obtained from the Surgeon General of the United States Public-Health Service, or his accredited representative, a permit stating that said person may be received under such restrictions as will prevent the spread of the disease, and said restrictions shall be specified in each instance: *Provided*, That, in addition to the above, permits shall also be obtained from the health authorities of the States, Territories, or districts to and from which the patient intends to travel.

Transportation  
of lepers.  
Amendment of  
May 15, 1912.

SEC. 30. No person knowing or having reason to believe that he is a leper shall accept transportation or engage in travel in interstate traffic unless permits have been obtained as set forth in the preceding section and

Amendment of  
May 15, 1912.

<sup>1</sup> The common carrier should require any such person to refrain from spitting in any place other than the sputum cup above mentioned, and in the event of coughing or sneezing to so cover the mouth and nose with a handkerchief, napkin, or similar device as to prevent the ejection of particles of mucus or saliva into the surrounding atmosphere.

<sup>2</sup> See appendix.

unless said person shall have agreed in writing to comply with the restrictions as specified in the permits mentioned above.

Amendment of  
May 15, 1912.

SEC. 31. Any person who presents symptoms of leprosy and who is traveling or who has left the State where he resides in violation of the above regulations shall be detained and, if proven to be a leper, shall be returned to such State or removed to such Federal station as the Secretary of the Treasury may designate and the proper health authorities notified.

Incubation  
periods.

SEC. 32. For the purpose of these regulations the following shall be considered as the periods of incubation:

Disease.	Days from last exposure.
Plague.....	7
Cholera.....	5
Smallpox.....	14
Yellow fever.....	6
Typhus fever.....	12
Typhoid fever.....	14
Scarlet fever.....	7
Diphtheria.....	4
Whooping cough.....	10
Measles.....	14

Notification of  
contagious or in-  
fectious diseases.

SEC. 33. Interstate sanitary officers and State, Territorial, and other health authorities who will undertake to enforce the interstate quarantine regulations, as provided by section 3 of the interstate quarantine law approved February 15, 1893, shall notify the Surgeon General of the United States Public-Health Service immediately, by telegraph and letter, upon the occurrence of a case or cases of cholera, yellow fever, typhus fever, or plague and shall render monthly reports as to the prevalence of smallpox, leprosy, scarlet fever, diphtheria, typhoid fever, poliomyelitis (infantile paralysis), epidemic cerebrospinal meningitis, Rocky Mountain spotted or tick fever, tuberculosis, and other diseases notifiable in their respective jurisdictions.

Notification of  
unusual outbreak  
of disease.

SEC. 34. Upon the occurrence of an unusual outbreak, or in the event of a sudden increase in the number of cases of smallpox, scarlet fever, diphtheria, typhoid fever, poliomyelitis (infantile paralysis), epidemic cerebrospinal meningitis, Rocky Mountain spotted or tick fever, or epidemic septic sore throat in any locality, the Surgeon General of the United States Public Health Service shall be immediately notified by telegraph and letter of such unusual outbreak or sudden increase by

the officers and authorities mentioned in the preceding section.

SEC. 35. Commissioned medical officers of the United States Public Health Service, when detailed as interstate sanitary officers, shall cooperate with State, municipal, and other health authorities in the execution of their regulations, as provided by section 3 of the act of February 15, 1893, and shall enforce these regulations and collect epidemiological and sanitary information and perform such other duties in such manner as the Secretary of the Treasury may approve.

Interstate sanitary officers.

SEC. 36. During the period beginning March 15 and ending June 15 of each year common carriers shall not accept for interstate shipment, and no person shall offer for interstate shipment, any cattle, horses, sheep, goats, elk, deer, or hogs originating in a locality where Rocky Mountain spotted fever is known to exist, unless said shipment is accompanied by a certificate from a Federal, State, or local health authority, or an inspector of the Bureau of Animal Industry of the United States Department of Agriculture, or a State veterinarian or his deputy, setting forth that the said animals are free of all attached wood ticks, or have been freed thereof by hand picking, spraying, or dipping in a disinfectant solution of sufficient strength and for a sufficient time to kill all ticks attached to the said animals, such hand picking, spraying, or dipping to be accomplished immediately prior to leaving the infected territory.

Shipment animals from localities infected with Rocky Mountain spotted fever.





## APPENDIX.

## DISINFECTANTS.

Disinfectants are usually divided into the following general classes:

1. Physical agents, including sunlight, dry heat, burning, boiling, steaming, electricity, etc.
2. Gaseous, including formaldehyde, sulphur dioxide, chlorine, etc.
3. Chemical solutions, including bichloride of mercury, formalin, carbolic acid, trichresol, lysol, creolin, potassium permanganate, lime, chlorinated lime, the hypochlorites, etc.

With the exception of heat, sulphur dioxide is the only one of the above-mentioned disinfectants that is used to any extent as an insecticide, while other substances used for this purpose are hydrocyanic acid gas, pyrethrum, petroleum, etc.

## PHYSICAL DISINFECTANTS.

*Burning*.—Of unquestioned efficiency, but seldom used.

7.—Very efficient and of wide range of applicability. The articles must be boiled for not less than 10 minutes in water actually boiling (100° C.). The addition of carbonate of soda renders the process applicable to polished metals. When formalin is used, the process is applicable to painted surfaces, or tools (articles of aluminum excepted).

When formalin is in the form of a solution, or in the form of a gas, or in the form of a solid, it is not applicable to polished surfaces. It is, however, applicable to the disinfection of articles of aluminum (excepted). When formalin is in the form of a solution, it is not applicable to polished surfaces. It is, however, applicable to the disinfection of articles of aluminum (excepted). When formalin is in the form of a gas, it is not applicable to polished surfaces. It is, however, applicable to the disinfection of articles of aluminum (excepted). When formalin is in the form of a solid, it is not applicable to polished surfaces. It is, however, applicable to the disinfection of articles of aluminum (excepted).

A convenient and effective way of obtaining the designated pressure, a longer exposure of permanganate, or in the result.

latter. By using a greater pressure with vacuum: Steam in a special apparatus with vacuum may be evolved from the method of applying steam under pressure, the object of the treatment of permanganate, to expel the air and to promote the penetration of the steam. comparatively dry state, continued for 30 minutes after the pressure reaches 10 pounds to additional permanganate. when the proportions are injured by steam, such as leather from which all the water is

For mixing the formalin and 5 ounces of water should be thrown over, so that the carpet or floor may be efficiently and least injuriously disinfected by formaldehyde gas, such as leather, furs, skins, rubber, trunks, bound books, silks, and fine woollens, should not be disinfected by formaldehyde gas or by any of these regulations which may be applicable thereto. Those articles which are wetting should be disinfected by a gaseous agent. Luggage, clean and in good condition, but suspected of being infected, should be disinfected by formaldehyde gas.

## GASEOUS DISINFECTANTS.

the reaction, which is quantities of disinfectant substances to be used for gaseous placed upon a noninfected contents of the space to be disinfected should always be

With this method tents are usually expressed in terms of a thousand cubic feet.

A room, each dimension of which is 10 feet, contains 1,000 cubic feet, and the cubic contents of any space can be determined by multiplying together the length, width, and height, expressed in feet, which will give the contents in cubic feet.

To prevent the escape of the gas from the inclosure to be disinfected, fireplaces, ventilators, cracks of doors and windows, and other openings can be stuffed with cotton, paper, cloths, etc., but they are best closed by pasting them up, for which purpose strips of newspaper and a paste made from flour can be used.

All articles to be disinfected should be well exposed to the action of the disinfectant, as the penetrating powers of all gaseous disinfectants are more or less limited; therefore articles should either be hung up or otherwise freely exposed to the gas.

#### FORMALDEHYDE.

For disinfection purposes formaldehyde gas is usually produced from the aqueous solution of the gas, the official (U. S. P.) name of which is "solution of formaldehyde." The common commercial name for it, however, is "formalin," and since this name has been used in designating one of the principal methods of producing the gas—namely, the "formalin-permanganate" method—the solution will be referred to under the name of "formalin."

Formalin is supposed to contain 40 per cent of formaldehyde gas by volume, but from evaporation and deterioration it often falls short of this quantity, seldom containing more than 37 per cent of the gas. The gas, when used under favorable conditions, is one of the most powerful germicides at our disposal. In addition to its germicidal efficiency it has the unique advantage over most other disinfectants that it is not injurious to the ordinary household furnishings. Furniture, wall hangings, paintings, wearing apparel, and fabrics, with the possible exception of some of the very delicate aniline colors and polished steel, are not exposed to the action of this gas.

It acts quickly as a germicide, but its powers of penetration are such that it is necessary to have articles freely exposed in order to insure disinfection. On account of lack of penetrating power formaldehyde is not adapted for use upon to disinfect mattresses, upholstered furniture, or articles requiring deep penetration; consequently instead of exposing them to the gas they should be either burned, boiled, steamed (under pressure), or exposed to a solution in order to make sure of destroying all possible infection.

Unfortunately the germicidal powers of formaldehyde are greatly affected by climatic conditions. With the temperature and humidity of the United States its efficiency as a surface disinfectant is unequal. At a temperature is about or below 50° F., or the moisture in the air is less than 50 per cent of saturation, the efficiency of formaldehyde is very low. At a temperature and humidity being below the points stated, poisoning of the formaldehyde takes place and its power of penetration is very slight, is still further diminished. These effects of low temperature may in part be overcome in room disinfection by artificial heating, by boiling water in the room, by sprinkling the floors with an increased quantity of formaldehyde.

Formaldehyde gas is useless as an insecticide and should not be used for that purpose. Flies and mosquitoes are killed by it only after a long exposure in concentrated form. It is nontoxic to the higher forms of life, but produces in them an irritation of the respiratory, nasal, and eye membranes, thus causing coughing, sneezing, and "watering" of the eyes. If the exposure is prolonged these effects, however, are only temporary when no longer exposed to the gas.

Formerly formaldehyde gas was largely produced by means of autoclaves, etc., methods requiring special apparatus and a certain

ical skill in operating, but those methods have now largely been supplanted by simpler ones which can be used in any household. In view of this fact, only the following methods of evolving the gas will be described:

1. Formalin-permanganate method.
2. Formalin sheet spraying method.
3. Formalin-aluminum sulphate-lime method.
4. Paraform.

Regardless of which method is used, everything should be in readiness before the disinfection process is started. All trunks and drawers should be opened and most of the contained articles hung up or otherwise exposed in the room, particularly if there is a possibility of their being infected. All cupboards, closets, and bookcases should be opened.

Fireplaces, ventilators, and cracks of doors and windows to be closed should, with the exception of the doors of exit, be closed before the disinfection process is started.

To get rid of the formaldehyde gas remaining after disinfection it is usually sufficient to open the doors and windows and allow it to blow out. Ammonia was formerly used to a limited extent for neutralizing the gas, but as it often causes a portion of it to precipitate in the form of a powder, which when heated or moistened will again give off a certain amount of formaldehyde gas, ammonia is now seldom used for that purpose. Even when the formaldehyde is allowed to blow out the odor of the gas is often perceptible for several days following disinfection. This, however, causes no trouble or inconvenience.

After disinfection with formaldehyde the quarters can usually be occupied an hour or two after opening the doors and windows.

#### FORMALIN-PERMANGANATE METHOD.

When formalin is poured upon crystals of permanganate of potash a vigorous reaction takes place, accompanied by strong ebullition of the liquid and sufficient heat to produce a large quantity of formaldehyde gas, water, vapor, etc. The time required for the reaction to begin, or at least to become apparent, varies from a few seconds to a minute or two, depending upon the temperature. The reaction is apparently over in a few minutes and with proper proportions of substances the residue in the vessel is almost dry.

A convenient and efficient proportion to use is two parts of formalin to one part of permanganate, or in the proportion of a quart of the former to a pound (pint) of the latter. By using a greater proportion of permanganate than this, slightly more gas may be evolved from the formalin, but in addition to requiring an increased expenditure of permanganate the danger of fire is also increased, as formaldehyde gas in a comparatively dry state is inflammable. The increased oxidation resulting from the additional permanganate is therefore more liable to cause combustion of the gas than when the proportions are used as just stated.

For mixing the formalin and permanganate a large galvanized-iron pail is very suitable. Pots or earthen vessels, usually being thick, are not as suitable as thin pails, on account of absorbing much heat from the reaction. The pail may be heated before mixing the formalin and permanganate. On account of the vigorous ebullition during the reaction a 10-quart pail should be used for mixing therein 10 ounces of formalin and 5 ounces of permanganate. Even then a few drops of the mixture may be thrown over, so that it is well to place the pail in a large tin pan or upon something to protect the carpet or floor. To prevent this sputtering over there is some advantage in using a pail with a flared top. As the process is attended with slight danger of fire, the reaction, which is quickly over, should be watched through a window or the pails placed upon a noninflammable surface.

With this method the formaldehyde gas is evolved so quickly and in such a large volume that it is unnecessary, in houses with well-fitting doors and windows, to paste

up cracks unless only a portion of the house is to be disinfected and the remainder is to continue to be occupied.

Closets, drawers, trunks, etc., should be opened, and when everything is in readiness the permanganate is placed in the pail and the formalin poured over it. All inside communicating doors, halls, etc., should be opened and at least one pail placed in each room and hall, unless the rooms are very small. Large rooms may require more than one pail unless a pail proportionately large is used.

The quantity of formalin and permanganate to be used per 1,000 cubic feet of room space depends upon conditions. If the atmosphere is warm and humid 10 ounces of formalin and 5 ounces of permanganate are sufficient, while if it is dry and cold double these quantities should be used. The pails should be distributed about in the room or rooms as stated and the necessary quantity of permanganate weighed and placed in them. The formalin for each pail should then be measured into a wide-mouthed cup or vessel and placed by the pail in which it is to be used. Do not use narrow-necked bottles or the pouring will require too much time. Although the reaction of formalin with permanganate takes place quickly by making preparations as advised one operator can "set off" a number of pails, there being nothing to do except to pour the formalin over the permanganate. Of course the mixing should begin in the rooms most distant from the door of exit.

The time of exposure—that is, the time the premises should be kept closed—should be at least two, and, preferably, four hours. At the end of this time the doors and windows are opened and the gas allowed to dissipate.

#### FORMALIN SHEET-SPRAYING METHOD.

This is a very simple and inexpensive method of evolving formaldehyde gas from formalin, and when properly used under favorable conditions is efficient. Formalin, sheets, and a means of spraying the formalin upon the sheets are all that are required in the way of appliances. The sheets should be hung up over a cord or line and allowed to hang at an angle of about 45°, and it is of advantage, too, to slightly dampen them with water before hanging them up, as the formalin will then be quickly absorbed and lessen its tendency to run off the sheets.

The formalin should be evenly sprayed upon the sheets, which can be done with any spraying device, a very simple one being a flower-watering pot provided with a sprinkler. The spraying should be done rather quickly, as the gas soon begins to be given off. The process should be carried out in each room. Not over 10 ounces of formalin should be used for every 30 square feet of sheet surface. The area of a sheet is found by multiplying its length by its breadth.

This method is particularly applicable where a long exposure may be allowed, as the gas is gradually given off and the percentage of formaldehyde remains comparatively high during a relatively long time. This method should not be used at temperatures below 60° F., as the formalin polymerizes on the sheets and very little gas is liberated. With fairly closely fitting doors and windows, pasting of cracks is unnecessary, unless a strong wind is blowing. However, large openings like fireplaces, openings into chimneys, ventilators, etc., should be closed either by pasting or with bunches of old rags.

As this method should be used only during warm months, 10 or 12 ounces of formalin for each 1,000 cubic feet of air space are sufficient.

The time of exposure should be from four to six hours. Open the doors and windows and, when possible, remove the sheets. The sheets are not injured in any way by the formalin.

#### FORMALIN-ALUMINUM SULPHATE-LIME METHOD.

In this method 2½ pounds of commercial aluminum sulphate are dissolved in 2 quarts of hot water and allowed to stand for a few hours. To 1 quart of this solution 3 quarts of formalin are added. To evolve formaldehyde gas from this latter solution

it is poured over unslaked lime in the proportion of 10 ounces of the solution to 1 pound of lime. Just before using the lime it should be broken into small particles. It should slake easily in cold water. The lime should be placed in a pail or vessel and the solution poured over it. A few minutes after pouring the formalin-aluminum sulphate solution over the lime, the latter begins to slake and continues for 20 to 30 minutes, during which time formaldehyde, steam, etc., are given off. The percentage of formaldehyde gas liberated by this method is relatively small as compared with the formalin-permanganate method, but since a small quantity of formaldehyde is efficient when used under favorable climatic conditions this method will then give efficient results. This method should not be used in cold, dry weather.

About 15 ounces of formalin-aluminum sulphate solution, made as described above, and  $1\frac{1}{2}$  pounds of lime should be used for each 1,000 cubic feet of air space. Cracks should be pasted up and fireplaces and ventilators closed, as the percentage of gas given off is relatively small. The time of exposure should be from four to six hours. The process should be carried out in each room.

This method of evolving formaldehyde gas has no advantages, but several disadvantages, as compared with the formalin-permanganate method, and is now seldom used. It is not as efficient as the sheet-spraying method.

#### PARAFORM.

Paraform can be used, particularly for disinfecting small inclosures, under the same conditions of heat and moisture as already stated with regard to the other methods.

Paraform is one of the polymeric forms of formaldehyde. It is a white powder and readily burns with a blue flame. For disinfecting purposes it should be heated to convert the paraform into formaldehyde gas, but under no condition should it be allowed to burn, as the combustion destroys practically all of the formaldehyde. A good method of producing formaldehyde gas from paraform is to place the paraform in a metal utensil under which a lamp or alcohol flame can be arranged. A special lamp or device can be obtained for the purpose, but an ordinary pint tin cup will suffice for heating therein an ounce or two of paraform. The paraform is placed in the cup and a flame applied underneath. The flame should not be too strong, for should the paraform ignite no formaldehyde gas will be produced and there will be no disinfection. The space to be disinfected should be tightly closed and all cracks pasted up. For each 1,000 cubic feet of air space 2 ounces of paraform should be used. The time of exposure should be about four hours. If necessary the flame under the utensil containing the paraform can be left burning during the time of exposure.

A solution of paraform can be made and used in the same manner that formalin is used in the formalin-permanganate method. For disinfecting 1,000 cubic feet of space 2 ounces of paraform are dissolved in 8 ounces of boiling water. This solution is then poured over 5 ounces of permanganate of potash contained in a 2-gallon pail, the details of procedure being the same as have been described for the formalin-permanganate method.

There are many forms of candles and other preparations of paraform made and sold upon the market for disinfection purposes, but it should be borne in mind that any preparation of paraform requiring that the compound be ignited and burned in order to produce formaldehyde gas is useless for disinfection purposes, as the formaldehyde is destroyed by the combustion.

In using those preparations of paraform that are heated to produce the gas, due allowance must be made for other ingredients than paraform contained therein, and therefore a larger quantity should be employed than when using pure paraform, as at least 2 ounces of paraform are required for each 1,000 cubic feet of space to be disinfected. For the reasons stated, the use for disinfection purposes of proprietary preparations of paraform of unknown strengths should as far as possible be avoided.

## SULPHUR DIOXIDE.

In the presence of moisture sulphur dioxide is an efficient surface disinfectant. Its powers of penetration are limited, and it will not kill spores, but when used under favorable conditions it will kill the contagion of most of the infectious diseases not due to spore-bearing organisms. Dry sulphur dioxide ( $\text{SO}_2$ ) is practically without germicidal powers, but in the presence of moisture this gas is converted into sulphurous acid gas ( $\text{SO}_3$ ) and sulphuric acid ( $\text{H}_2\text{SO}_4$ ), upon which efficient disinfection with sulphur gas depends. While these converted products are destructive to germ life, they are also injurious to household furnishings, fabrics, etc., which is one of the greatest drawbacks to the use of sulphur gas as a disinfectant. These injurious effects and the feeble germicidal properties of the gas in the dry state have greatly limited, its uses, particularly in household disinfection, but it is still especially applicable for destroying rats, flies, fleas, and other vermin that spread contagion, since it is highly fatal to animal life. It is, therefore, applicable and largely used for disinfecting holds of ships, stables, barns, granaries, freight cars, and structures of this character. Sulphur, either as flowers or in rolls or sticks, can usually be obtained at any drug store or crossroads store.

In the presence of moisture sulphur dioxide attacks and causes oxidation of most of the metals, which, however, can be prevented by previously vaselining the exposed surfaces. It bleaches and injures cotton, linen, and woolen fabrics, curtains, etc. It injures flour, except in the closed ("headed up") barrel. It softens paint and varnish, particularly if they have been recently applied. It injures soap, coffee, tea, sugar, rice, matches, etc., when they are freely exposed to it. It injures clocks, and it discolors wall paper if moisture is present.

The moisture necessary in destroying germ life with sulphur dioxide can usually be artificially produced without difficulty, as it can be added in the form of steam (sulphur furnace), and in the pot method it is automatically produced from the water in the pan in which the sulphur pot is placed. However, when using sulphur dioxide as a disinfectant in damp weather or in disinfecting holds of ships, which are usually damp, the artificial production of moisture is unnecessary.

The inclosure to be disinfected with sulphur gas should be made as tight as possible: therefore the cracks of doors, windows, and keyholes should be pasted up; and fireplaces, ventilators, radiators, and all openings should be tightly closed, either by pasting or in some other manner. This should all be done, except the door of exit, before starting the disinfection. For pasting, strips of paper and a paste made from flour can be used. After the disinfection is over the pastings can be moistened with water and washed off. It is necessary, to avoid injury to the articles enumerated above, to remove them from the space to be disinfected. Brass or any metal furnishings are not injured, provided they are given a thin coating of vaseline.

The principal methods of using sulphur dioxide are:

1. The pot method.
2. Liquid sulphur dioxide.
3. Sulphur candles.

## THE POT METHOD.

This is the cheapest and simplest method of producing sulphur dioxide. The only materials required are pots, sulphur, and a small quantity of alcohol. Sulphur burns when liberally sprinkled with alcohol and lighted. It can also be started burning by placing a shovelful of hot coals of fire into it. As sulphur dioxide is produced by combustion of the sulphur, and as the combustion is dependent upon the available oxygen of the air, it will readily be seen that the rapidity of production of the sulphur gas will be governed by the area of the burning surface. It is therefore very important for rapid production that broad shallow pots be used.

Ordinary "Dutch ovens," iron buckets, etc., may be used, but the best pot for the purpose is one with a flat bottom, 12 to 18 inches in diameter, and with sides about 4 inches high. A dish pan answers the purpose very well.

Theoretically, the complete combustion of 1 pound of sulphur in a space of 1,000 cubic feet produces 1.15 per cent of sulphur dioxide, though 1 per cent is about what is produced in actual practice. Therefore, as 5 per cent is required to kill nonspore-bearing organisms, it is necessary to burn 5 pounds of sulphur for each 1,000 cubic feet of space to be disinfected.

After estimating the cubic space to be disinfected the sulphur should be weighed, allowing 5 pounds for every 1,000 cubic feet of space.

Sufficient pots should be available so that a depth of not more than  $1\frac{1}{2}$  to 2 inches of sulphur will have to be placed in each pot, although necessity sometimes requires a greater depth than this. The sulphur should be sloped toward the center so as to form a crater or depression.

When using stick sulphur a portion of it should be pulverized or broken up. The pots should be distributed in the rooms to be disinfected according to the size of the rooms and number of pots. They may be placed upon the floor, tables, stoves, hearths, etc.

It should be borne in mind that the burning sulphur causes the pots to become very hot, and to avoid danger from fire it is necessary to place them upon objects not combustible or injured by heat. As already stated, this is best accomplished by arranging them in pans containing an inch or two of water, as besides the protection the heat produces moisture from the water which is necessary in sulphur disinfection. Pans not being available, the pots may be stood upon earthen or metal surfaces and efficient disinfection done, provided the atmosphere is reasonably damp. Theoretically, about 3 ounces of water should be volatilized for each pound of sulphur burned. The sprinkling of the sulphur with alcohol and lighting should not be done until everything is in readiness. A convenient and safe method of lighting the alcohol in the pots is to strike a match and before the head is entirely ignited to throw it into the pot. This will cause the alcohol to ignite. After lighting, the sulphur fumes do not begin to come off for a few minutes, so that one operator can start a number of pots. After lighting the pots, observe that they are all burning; then close the door of exit and paste up its cracks.

When the sulphur has been burning half an hour, search for sulphur fumes escaping from any openings that may have been overlooked and close them.

Leave the apartment or room closed for 12 hours, and then open doors, windows, etc., and allow the remaining sulphur fumes to blow out. It is well to have the windows so they can be opened from the outside, otherwise entrance to the rooms may be impossible for an hour or so. The rooms can usually be occupied in two or three hours after opening the doors and windows.

#### LIQUID SULPHUR DIOXID.

The technique of disinfection with liquid sulphur dioxide differs from the pot method only in the manner of production; therefore that is the only phase of the subject that will be described here, the reader being referred to the description already given for further details.

The method has the advantage of liberating a large quantity of sulphur dioxide in a short time, but it is far more expensive than burning sulphur by the pot method, the relative cost being about 10 to 1. The method of using liquid sulphur dioxide, however, is very simple and it is free from any danger of fire. The liquid is prepared commercially and is usually obtained in metal cans or casks, which for use only require the simultaneous cutting of the leaden pipes on the tops of the necessary

number of cans and the inversion of the latter in a metal or earthen vessel, when volatilization rapidly takes place.

To obtain the 5 per cent of sulphur dioxide required for disinfection it is necessary to use 10 pounds of liquid sulphur dioxide for every 1,000 cubic feet of air space. Therefore the space should be estimated and the required quantity of liquid dioxide obtained. Of course, with this method the same preparations and precautions with regard to injury of certain articles should be carried out as with the pot method. If a number of adjoining rooms are to be disinfected it is best to begin opening and inverting the cans in the most distant rooms and work toward the door of exit. It is necessary to have everything in readiness and to work quickly, as the gas is given off rapidly. If the container of the liquid dioxide is provided with a siphon or tube, the liquid can be introduced by means of a tube through the keyhole into a suitable receptacle inside the room. The time of exposure should be 12 hours.

One striking disadvantage of this method as compared with the pot method is that it produces no moisture, which is necessary to obtain the maximum disinfecting power of sulphur dioxide.

#### SULPHUR CANDLES.

As sulphur candles are applicable only for killing insects and not for disinfection purposes, the method of using them will be described under sulphur as an insecticide.

### CHEMICAL SOLUTIONS.

#### BICHLORIDE OF MERCURY.

This substance is also known as corrosive sublimate, bichloride, and mercuric chloride. In the pure state it is a white crystalline substance and fairly soluble in water, thus differing from calomel (mercurous chloride), which is a white amorphous powder and insoluble in water.

The "antiseptic tablets" sold on the market are usually composed of bichloride of mercury. These tablets are generally artificially colored (blue) in order to lessen the chances of accidental poisoning, as bichloride of mercury dissolved in water makes a perfectly clear solution.

Bichloride of mercury is one of the most powerful germicides that we possess. It has the disadvantages, however, of corroding metals, forming inert compounds with albuminous matter and of being very poisonous. It is therefore inadvisable to use it for disinfecting sputum, excreta, or under any condition in which it comes in contact with much albuminous or organic matter, since it forms inert compounds with these substances.

One part of bichloride of mercury will dissolve in 16 parts of cold water and in 3 parts of boiling water. The bichloride should be pulverized before attempting to dissolve it. Even then it dissolves with some difficulty. The solubility is increased by using sea water for the solution or by adding 2 parts per 1,000 of sodium chloride (common salt) to the water employed. The water used should be free from organic matter, and for dissolving the bichloride it is preferable that the water be hot.

The strength of solution used in disinfecting for the infectious diseases is usually 1 part of bichloride to 1,000 parts of water—i. e., a strength of 1 to 1,000. This solution is made by dissolving 1 ounce of bichloride in 1,000 ounces of water (approximately 8 gallons). A 1 to 500 solution is made by dissolving 1 ounce in 500 ounces of water, and so on for any other strength desired. The solutions are best made in an earthen or wooden vessel, a wash tub or barrel being very suitable. The addition of a little indigo or other coloring matter will avoid the possibility of the solution being drunk by mistake.

To disinfect soiled clothing, bed-linen, etc., the material should be placed in a tub containing 1 to 1,000 solution and left for an hour. It can then safely be taken out



and rinsed in water and laundered. Bichloride of mercury, however, is a mordant, and clothing containing stains, such as blood, etc., will be permanently stained if immersed in bichloride solution. Eating utensils should not be placed in bichloride of mercury on account of the danger from poisoning. Infected floors, tables, wooden beds, chairs, walls, etc., can be washed with a 1 to 1,000 solution of bichloride of mercury. For applying it a floor mop may be used. Saturate the floors and other surfaces with the solution and allow them to dry. The hands and body, except the face, can be bathed in a 1 to 1,000 solution without injury thereto.

As already stated, feces, urine, sputum, and products containing albuminous matter should not be disinfected with bichloride solution unless no other disinfectant is available, in which case a 1 to 500 solution should be used.

"Antiseptic tablets" are usually very soluble in water, and the method of obtaining the desired strengths is stated on the label of the container. They are very useful when only a small quantity of bichloride solution is required. A 1 to 1,000 solution is easily prepared from them and is of service for washing the hands after handling the sick or any possibly infected material. The hands should be bathed in the solution for two to five minutes after cleansing them with soap and water.

#### FORMALIN (SOLUTION OF FORMALDEHYDE, U. S. P.).

Formalin, a solution of formaldehyde gas in water, is a valuable disinfectant. It has the advantage of bichloride of mercury in that its action is not retarded by albuminous matter. It is not corrosive; articles are usually not injured by it. It is a good deodorant, and it is not so highly poisonous as is bichloride of mercury.

Formalin contains from 35 to 40 per cent of formaldehyde gas, but in referring to percentage strengths the percentage of formalin will be stated and not that of the gas. For instance, a 1 per cent solution of formalin contains formalin in the proportion of 1 to 100, but it contains formaldehyde gas only in the proportion of 1 to 250, provided the formalin contains 40 per cent formaldehyde gas. Therefore, to make a 5 per cent solution of formalin, 1 volume of formalin is added to 19 volumes of water; and to make a 10 per cent solution, 1 volume of formalin is added to 9 volumes of water, etc.

Formalin is well adapted to the disinfection of urine, feces, sputum, and discharges of like character; for, in addition to disinfecting, it also deodorizes them. For this purpose a 5 per cent solution and one hour's exposure are required. The substances should be thoroughly mixed. Allowance must be made for the dilution caused by mixing the formalin solution with the material to be disinfected. For instance, if 1 pint of feces is to be disinfected it should be mixed with 1 pint of a 10 per cent solution of formalin, which gives the 5 per cent strength required.

Formalin can not be used in the sick room, as the liberated gas is irritating; nor is it adapted to the washing of floors, walls, etc., for the same reason.

Soiled linen and bedclothing can be disinfected by one hour's immersion in a 5 per cent solution of formalin.

Disinfection with formalin should be done out of doors, in order to avoid the irritating effects of the gas given off.

A few drops either of pure or diluted formalin poured into water closet bowls, urinals, sinks, etc., destroy offensive odors.

#### CARBOLIC ACID.

This is a very useful disinfectant. It has a penetrating odor, a strong, burning taste, and it is a corrosive poison. Pure carbolic acid crystallizes and becomes solid at ordinary temperatures, but it can be liquefied either by heat or by the addition of a small quantity of water, about 5 per cent.

Carbolic acid is soluble in about 15 parts of cold water; that is, 1 ounce of carbolic acid dissolves in 1 pint of water (16 ounces), which is about a 6 per cent solution.

Carbolic acid dissolves in water with some difficulty. Therefore, to insure its solubility, hot water should be used and the mixture well agitated.

For disinfection purposes carbolic acid is commonly used in solutions of 3 to 5 per cent. A 3 per cent solution is made by adding 3 volumes of carbolic acid to 97 volumes of water; a 5 per cent solution is made by adding 5 volumes to 95 volumes of water, etc.

In these strengths carbolic acid is not destructive to fabrics, colors, metals, etc. Therefore, it has a wide range of usefulness in disinfection. As it does not actively coagulate albuminous matter, it is useful for the disinfection of urine, feces, sputum, etc. For this purpose a 5 per cent solution is added to an equal volume of the excretions, the mass then thoroughly mixed, and allowed to stand one hour before final disposal.

Soiled linen, bedclothes, etc., are best disinfected by immersion for one hour in a 3 per cent solution, and the same strength solution should be used for mopping floors, walls, etc. After handling the sick or any objects possibly infected, such as bed-pans, sputum cups, etc., the hands may be disinfected by washing them for two to five minutes in a  $2\frac{1}{2}$  per cent (1 to 40) solution of carbolic acid. The hands should then be washed or saturated with alcohol in order to avoid the benumbing effect of the carbolic acid. As carbolic acid does not kill spores, it should not be used to destroy the infection of tetanus, anthrax, or malignant oedema.

Crude carbolic acid, as sold upon the market, is a black, tarry liquid of very varying composition. It contains cresols and other compounds, but although some of these products have greater germicidal powers than pure phenol (carbolic acid) their solubility in water is so slight that the use of crude carbolic acid as a disinfectant is greatly limited. The reliability of crude carbolic acid is therefore questionable, and some sanitarians recommend that for excreta it be used in the proportion of not less than two volumes of crude carbolic acid (undiluted with water) to each volume of excreta.

Crude carbolic acid has a disagreeable odor, and leaves after use a tarry residue, which is objectionable. The crude article, however, is much cheaper than pure carbolic acid, and it is hoped that a simple means of increasing its solubility and of eliminating the objectionable tarry residue following its use may soon be found, so that it may at least be employed in the disinfection of urine, feces, sputum, etc.

#### TRICRESOL.

Tricresol has practically the same uses in disinfection as pure carbolic acid. It differs from phenol principally in that it is about three times as strong in germicidal powers. It therefore can be depended upon to kill spores. Tricresol is soluble in water up to about  $2\frac{1}{2}$  per cent solution—that is, 1 part of tricresol to 40 parts of water. A 1 to 2 per cent solution used under the same conditions and for the same purposes as already stated for carbolic acid is efficient for all ordinary purposes.

#### LYSOL AND CREOLIN.

These preparations have practically the same uses in disinfection as carbolic acid and tricresol and belong to the same general class of disinfectants.

In germicidal strength they rank with tricresol. Their uses are the same as tricresol and carbolic acid, which have been stated. They should be employed in a 1 to 2 per cent solution.

#### AGENTS FOR THE DESTRUCTION OF VERMIN.

The destruction of vermin and disinfection are often accomplished simultaneously in the process of disinfection, as most germicides are also destructive to vermin, a notable exception to this being formaldehyde gas, which, although a good germicide,

has little or no effect upon animal life. Therefore, in using gaseous germicides (disinfectants) as insecticides, they are applied in much the same manner when used for the latter as for the former purpose.

However, when using them for the destruction of animal life only they are ordinarily applied in a weaker strength and for a shorter time of exposure than when they are used for their germicidal effect.

In using gaseous insecticides, every care should be exercised to avoid the escape of the vermin from the inclosure during the process of killing; consequently all points of exit should be closed. Closets, bookcases, drawers, etc., likely to harbor or contain animal life, should be opened to allow access of the gas.

The following insecticides will be considered:

1. Sulphur.
2. Hydrocyanic acid gas.
3. Pyrethrum.

#### SULPHUR.

Sulphur is one of the most valuable and efficient insecticides that we possess. It may be used in several forms.

*Sulphur dioxide*.—The methods of producing this gas have already been described, therefore further description here will consist only of the differences between its uses and applications as an insecticide and those as a germicide.

As an insecticide sulphur does not require the presence of moisture, since it acts equally well in a dry as in a moist atmosphere. Therefore moisture should not be artificially produced, as the drier the atmosphere the less injury there will be to furnishings, colors, etc.

With all cracks and crevices closed to prevent their exit, a 1 per cent strength will kill flies and mosquitoes within two hours, and if the atmosphere is reasonably dry very little injury will be done to the ordinary room furnishings.

A 2 per cent strength will kill rats within four hours, and a 5 per cent strength will destroy most bedbugs, roaches, lice, etc., within six hours, although some of these insects usually escape by seeking protection in crevices. To obtain the desired strength of sulphur gas it is only necessary to remember that the burning of 1 pound of sulphur in 1,000 cubic feet of space produces approximately 1 per cent of the gas, 2 pounds, 2 per cent, etc.

*The pot method* of production has already been described. In order to burn the sulphur quickly it should not be placed in the pots to a greater depth than an inch. Water pans are not required, but the pots should be placed upon bricks, sand, stones, or something of that nature as a protection against fire. The pots are arranged and lighted with alcohol, as has been described.

*Liquid sulphur dioxide* is well adapted to the destruction of insect and vermin life, as the gas is liberated in a short time. Two pounds of the liquid are equivalent to 1 pound of sulphur when burnt by the pot method. The method of liberating the gas has been described.

*Sulphur candles* are sometimes useful for killing flies and mosquitoes, or where only a small percentage of the gas is required. Candles vary in weight, but their weight should be determined; for killing flies and mosquitoes not less than 1½ pounds of candle should be used for each 1,000 cubic feet. The candles require only to be placed upon bricks and lighted; they usually burn easily. The usual time of exposure (two hours) is required.

#### HYDROCYANIC ACID GAS.

This gas is very poisonous to all forms of animal life. It kills rats, mice, roaches, flies, fleas, mosquitoes, and bedbugs with great certainty and very quickly. *In the hands of the inexperienced it is a very dangerous gas, as the least carelessness with it may*

result in the loss of human life, since it is deadly poisonous. It is therefore unsafe and unwise to use in inhabited buildings, but it is useful for destroying all forms of vermin in cars, granaries, stables, barns, poultry houses, and other uninhabited buildings. For this purpose it is used in the following quantities and proportions for each 1,000 cubic feet of airspace:

	Ounces.
Potassium cyanide.....	5
Sulphuric acid (commercial 66B).....	5
Water.....	12.5

The acid and water are first mixed in an earthen vessel that will withstand heat, as this mixture gets very hot. The cyanide should not be added to it until the liquid has become cool. The required quantity of cyanide should be weighed and put into a gauze bag, and when everything is in readiness the bag is placed in the liquid contained in the vessel. The acid destroys the bag and acts on the cyanide with rapid evolution of the gas; and as the gas is deadly poisonous, the operator must leave the room at once.

A still safer method of adding the cyanide to the acid than the one just stated is to have the bag of cyanide suspended over the acid by means of a string leading to the door of exit, from which location it can be lowered into the acid when desired. In this manner one or more processes can be set off without danger to the operator.

The inclosure should be made as tight as possible to avoid the escape of the gas. The time of exposure should be one hour, though a longer period will minimize the danger from the gas in opening the doors and windows. It should be arranged before starting the process, so that the windows and doors can be opened from the outside; and it is best to hold the breath while actually opening a door or window. Under no condition should the building be entered until it has been aired out from 8 to 10 hours.

#### PYRETHRUM.

Pyrethrum is only a fairly good insecticide. It is not poisonous to man, nor are household furnishings of any kind injured by it. Unfortunately, it is not very powerful for the destruction of roaches, flies, fleas, and mosquitoes. Some of these insects are killed, while some are only stupefied, by pyrethrum, so that it is necessary after using it to sweep the insects up and burn them.

Pyrethrum may be used either in powdered form or as fumes resulting from burning. Persian and other insect powders sold upon the market usually contain pyrethrum in some form. As a powder it may be blown about in the closed room with a bellows in sufficient quantity to show perceptibly upon the floor, or it may be dusted into cracks, crevices, dark corners, closets, or special localities likely to be infested with mosquitoes, fleas, bedbugs, etc. After two hours' exposure the insects should, when practicable, be swept up and burned.

In burning pyrethrum for killing flies and mosquitoes the room should be closed as tightly as possible. In killing these insects in dwellings it is well to pull down all window shades except one, as the insects will then go toward the light of the window the shade of which is not drawn, and when they die or become stupefied they can be easily swept up. Pasting of door and window cracks is usually unnecessary.

From 2 to 4 pounds of pyrethrum should be burned for every 1,000 cubic feet. The pyrethrum is burned in pots, pans, or iron buckets in the same manner that sulphur is burned in the pot method. The pots should be used in sufficient numbers so that not more than 4 pounds of pyrethrum will have to be placed in each pot. They should be distributed about in the room upon metal or stone foundations, in order to guard against fire.

The pyrethrum is ignited by sprinkling it with alcohol and lighting. After the alcohol has burnt, the pyrethrum smolders and burns, thus liberating the

fumes. The time of exposure is usually two hours, although when working at night the quarters may be left closed until the following morning. As stated, the insects should be swept up and burned as soon as the quarters are opened. Both the fumes and the powdered form of pyrethrum are harmless to man, so there is no danger in entering quarters as soon as they are opened.

### DISINFECTION OF COMPARTMENTS.

Compartments or places in cars, vessels, vehicles, or conveyances operated in interstate traffic, which have been occupied by persons sick with contagious or infectious diseases, shall, unless otherwise specified in the special regulations, be disinfected prior to further use as follows:

The compartment or place, and all articles therein contained, shall be exposed to the action of formaldehyde gas, using 1 pint of a formaldehyde solution (U. S. P.) for each 1,000 cubic feet of space, the gas to be generated by one of the methods heretofore described, and the compartment or place so closed or sealed as to prevent the escape or leakage of gas.

The minimum number of hours' exposure as given above applies to empty rooms of tight construction containing smooth, hard, surfaces; the maximum number of hours' exposure applying in all cases to textiles and other articles of a similar kind requiring more or less penetration.

The stated time of exposure to sulphur dioxide and formaldehyde is sufficient to destroy bacterial infection due to non-spore-bearing organisms, provided the infection is present on the surface. If the room is of peculiar construction, so as to impede the diffusion of the gas, or if the room is a dirty one, or if on account of any other condition rendering the germicidal action of the gas more difficult, the time of exposure should be proportionately increased, or supplanted by other methods.

After gaseous disinfection, all bedclothes, towels, and similar articles shall be immersed for at least one hour in a 5 per cent solution of carbolic acid or formaldehyde, or disinfected by boiling or by steam. Mattresses, curtains, carpets, hangings, pillows, or other textile articles shall be burned or disinfected by steam. The floor, walls, and all other objects that will not be injured by liquids shall be mechanically cleaned and thoroughly wetted with a 5 per cent solution of carbolic acid or formaldehyde.

Textiles which are soiled with the discharges of the sick, or presumably are infected, must be disinfected by (a) boiling; (b) steam; (c) immersion in one of the germicidal solutions.

Cooking and eating utensils are preferably disinfected by immersion in boiling water or by steam, but where these are not available immersion in a 5 per cent carbolic-acid solution for at least one hour, followed by thorough washing and rinsing, shall be practiced.

Clothing, fabrics, textiles, curtains, hangings, etc., may be treated by either of the above methods, from (a) to (c), inclusive, as circumstances may demand, or by formaldehyde gas or sulphur dioxide where the article is of a character which will not be damaged by sulphur dioxide.

Living apartments, cabins, and forecastles of vessels shall be disinfected by one or more of the following methods:

(a) Sulphur dioxide, the destructive action of the gas on property being borne in mind.

(b) Formaldehyde gas.

(c) Washing with solution of bichloride of mercury, 1:1000, or 5 per cent solution of formaldehyde, or 5 per cent solution of carbolic acid, preference being given to carbolic acid for application to polished woods, bright metals, and other objects injured by metallic salts.

The forecastle, steerage, and other living apartments in bad sanitary condition must be disinfected by method (a) followed by method (c).

Mattresses, pillows, and heavy fabrics are to be disinfected by one of the following methods:

- (a) Boiling.
- (b) Flowing steam (i. e., steam not under pressure).
- (c) Steam under pressure.
- (d) Steam in a special apparatus with vacuum attachment.

Holds of cargo vessels, when cargo can not be removed, shall be disinfected in so far as possible by sulphur dioxide not less than 4 per cent volume strength, and where possible this should be generated from a furnace to minimize danger of fire in cargo.

Holds of iron vessels, empty, shall be disinfected by either of the following methods:

(a) Sulphur dioxide generated by burning sulphur, 5 pounds per 1,000 cubic feet of air space, or liberated from 10 pounds of liquid sulphur dioxide, sufficient moisture being present in both cases. Time of exposure 24 hours.

(b) Washing with a solution of bichloride of mercury, 1:1000.

### **BACTERIOLOGICAL STANDARD OF PURITY FOR DRINKING WATER SUPPLIED TO THE PUBLIC BY COMMON CARRIERS IN INTERSTATE COMMERCE.**

[Promulgated by the Secretary of the Treasury on Oct. 21, 1914.]

The following are the maximum limits of permissible bacteriological impurity:

1. The total number of bacteria developing on standard agar plates, incubated 24 hours at 37° C., shall not exceed 100 per cubic centimeter; provided that the estimate shall be made from not less than two plates, showing such numbers and distribution of colonies as to indicate that the estimate is reliable and accurate.

2. Not more than one out of five 10 c. c. portions of any sample examined shall show the presence of organisms of the *Bacillus coli* group when tested as follows:

(a) Five 10 c. c. portions of each sample tested shall be planted, each in a fermentation tube containing not less than 30 c. c. of lactose peptone broth. These shall be incubated 48 hours at 37° C. and observed to note gas formation.

(b) From each tube showing gas more than 5 per cent of the closed arm of fermentation tube, plates shall be made after 48 hours' incubation upon lactose litmus agar or Endo's medium.

(c) When plate colonies resembling *B. coli* develop upon either of these plate media within 24 hours, a well-isolated characteristic colony shall be fished and transplanted into a lactose-broth fermentation tube, which shall be incubated at 37° C. for 48 hours.

For the purposes of enforcing any regulations which may be based upon these recommendations the following may be considered sufficient evidence of the presence of organisms of the *Bacillus coli* group:

Formation of gas in fermentation tube containing original sample of water (a).

Development of acid-forming colonies on lactose litmus agar plates or bright red colonies on Endo's medium plates, when plates are prepared as directed above under (b).

The formation of gas, occupying 10 per cent or more of closed arm of fermentation tube, in lactose peptone broth fermentation tube inoculated with colony fished from 24-hour lactose litmus agar or Endo's medium plate.

These steps are selected with reference to demonstrating the presence in the samples examined of aerobic lactose-fermenting organisms.

3. It is recommended as a routine procedure, that in addition to five 10 c. c. portions one 1 c. c. portion and one 0.1 c. c. portion of each sample examined be planted in a lactose peptone broth fermentation tube, in order to demonstrate more fully the extent of pollution in grossly polluted samples.

4. It is recommended that in the above-designated tests the culture media and methods used shall be in accordance with the specifications of the committee on standard methods of water analysis of the American Public Health Association, as set forth in "Standard Methods of Water Analysis" (A. P. H. A., 1912).

[Form 8921.]

TREASURY DEPARTMENT, UNITED STATES PUBLIC HEALTH SERVICE.

**CERTIFICATE OF EXAMINATION OF WATER FOR PASSENGERS IN  
INTERSTATE TRAFFIC.**

This is to certify that the water supplied.....  
.....  
at....., for use of passengers in inter-  
state traffic has been examined and found.....to conform to the bacteriological  
standard promulgated by the Secretary of the Treasury on October 21, 1914.  
Date of examination.....  
(Signature of health authority).....  
(Official title of health authority).....  
Address.....

**INSTRUCTIONS RELATIVE TO THE CERTIFICATION OF WATER FUR-  
NISHED TO PASSENGERS IN INTERSTATE TRAFFIC.**

Samples of water from each and every source of supply should be subjected to bacteriological examination at least once in every six months by the United States interstate sanitary officer or the State or municipal health authority within whose jurisdiction the supply is obtained, or by any person competent to make such examinations, and whose results will be accepted by the State or municipal health authority whose duty it is to issue certificates.

Officers of the United States Public Health Service are authorized to make bacteriological and chemical examinations, and to certify to the purity, of water furnished to passengers in interstate traffic.

The common carrier desiring a certificate should make application therefor to the State or municipal health authority within whose jurisdiction the water is obtained, or to the United States interstate sanitary officer of the district in which the water is obtained.

After the necessary examinations have been made, the certificate should be issued on Form 8921, "Certificate of Examination of Water for Passengers in Interstate Traffic," in triplicate. The certifying authority should retain one copy of the certificate and deliver two copies to the common carrier, who should forward one copy to the Surgeon General, United States Public Health Service, Washington, D. C.

Whenever there is an unusual prevalence of typhoid fever, dysentery, infantile diarrhea, or other water-borne disease in a locality from which common carriers receive water, an additional examination of the water should be made and a supplemental certificate issued by the proper certifying authority and forwarded as above.

Certificates of examination of ice are not required.















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